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ABSTRACT

It is widely accepted that within certain biological limits, a child's development emerges out of a continuous and increasingly complex interaction with significant people in his or her environment. Mothers and other significant adults, as experienced members of the culture, may be viewed as mediators and tutors who transmit cultural knowledge and skills to children. This study is part of a larger investigation of cultural competence as a renewable resource in urban slums, and compared previous studies in Norway with the present Egyptian study. The subjects were 25 Egyptian mothers and their preschool children. The relationship between mothers' teaching styles and their children's educability and cognitive functioning was assessed by administering the Running Horse Game Test (which requires rule-understanding and planning) and the Raven Progressive Matrices intelligence tests separately to mother and child. The results indicated a significant relationship between mother's teaching and her child's educability. In addition, the mother's intelligence and education were related to her teaching, and less strongly to the child's educability. Her teaching strategy was, however, more predictive than intelligence and education were of the child's educability, and was a substantially more predictive factor of the child's intelligence. These findings are parallel to the previous Norway studies, suggesting that the effects of maternal teaching have some transcultural validity. (Contains 27 references.) (MOK)

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MOTHERS AS MEDIATORS OF MEANING IN THE DEVELOPMENT
OF COGNITIVE COMPETENCE IN EGYPTIAN PRESCHOOL CHILDREN

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Abstract

Twentyfive Egyptian mothers and their preschool children (6-8 years) were investigated to assess the relationship between mothers' teaching style, and their children's educability and cognitive functioning. The study is part of a larger investigation of cultural competence as a renewable resource in urban slums. Mother and child were tested for the mother's teaching style and the child's educability with the *Running Horse Game Test (RHGT)*. Mother and child were tested in separate settings, thus preventing interdependency among scores. The game included rules about routes, short cuts and potential set-backs which required rule-understanding, planning and making choices to play most rationally to win. Intelligence tests (Raven Progressive Matrices) were also administered to mother and child. Two main bipolar factors emerged from factor analyses of game behavior: The mother's degree of decentred teaching (DDT) (information, demonstrating alternatives, anticipation and seeking feedback, child-oriented winning and emotional support vs ordering, restriction, imperative feedback and self-centred winning) and the child's degree of decentred educability (DDE) (rule mastery, adequate interest, decision making and planning behaviors vs passivity and irrelevant behaviors). Only the mother's DDT predicted the child's DDE in a stepwise regression analysis which also included her intelligence and education, but not when her teaching style was entered after the latter variables. The mother's teaching style, intelligence and education all predicted the child's intelligence. Her teaching contributed independently to the prediction beyond the contribution of the two other variables. Although the mother's teaching style predicted both intelligence and educability in the child, the latter two variables were unrelated and may therefore represent two different aspects of cognitive competence. The findings confirm previous studies in Norway using RHGT (Hartmann, 1991; Hartmann & Haavind, 1981). Despite marked differences in the Egyptian and Norwegian samples in levels of education, intelligence and average DDT and DDE scores, however, the structure of both bipolar factors were identical and a significant relationship between mother's teaching and her child's educability were found in both countries. These findings suggest that the results may have some transcultural validity.

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It is widely accepted that within certain biological limits, the child's development emerges out of a continuous and increasingly complex interaction with significant people in his or her environment. Mothers and other significant adults, as experienced members of the culture, may be viewed as mediators and tutors who transmit cultural knowledge and skills to children (Bruner & Bornstein, 1989). Feuerstein (1980) and Klein and Feuerstein (1985) have provided evidence for a theory of cognitive development where human mediators must be operative in order to make experiences meaningful for the developing child. Vygotsky (1978) has studied the role of verbal communication in structuring the child's developing cognitive processes. He proposed the concept zone of proximal development, where the child, when supported by a more experienced person who is able to adjust the adult-child dialogue to fit within the child's zone of proximal development, may perform tasks that he or she might otherwise be unable to accomplish. The term scaffolding (Bruner, 1983, 1986) indicates the supportive role of the adult's verbal and nonverbal behavior in helping the child to accomplish tasks beyond the limits of their individual skills, thereby helping the child to expand current skills and knowledge to a higher level (Bickhard, 1992; Wertsch, 1985). Earlier Hunt (1961) has pointed out that social interaction has to match the child's level of cognition, emotional state and actual behavior in order to create a developmentally appropriate challenge and thus play a promoting role for cognitive development. In accordance with this view, studies by Hartmann (1991) and Hartmann and Haavind (1981) have reported stable, significant correlations between maternal teaching styles of different mediating quality and the child's educational and cognitive competence. Furthermore Hartmann (1995) has shown that

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maternal style, assessed when the child was seven years old, was a powerful predictor of independent behavior and academic success in young adulthood. These results are in line with other studies (Bee, van Egeren, Streissguth, Nyman & Leckie, 1969; Hatano, Miyake & Tajima, 1981; Hess & Shipman, 1968; Klein & Feuerstein, 1985; Laosa, 1982; Wood, 1988) demonstrating significant relations between measures of children's cognitive competence during pre-school years and aspects of maternal tutoring. Mothers who in their interaction with the child attempt to explain, teach, reason with, help, praise and encourage the child create social interactions which tend to be more stimulating for mental development than mother-child interactions characterized by strict control, command and punishment. Thus, individual differences in maternal interaction style may differ in mediating quality or tutorial competence, and thus affect social and cognitive development in different ways.

Western psychological research accentuates sensitive caretaker observation of child needs, face to face verbal interaction, sharing of focus, give and take interaction, etc. for the development of both attachment and cognitive development (Sroufe, 1989; Stern, 1985; Trewarthen, 1992). It has, however, been suggested that in societies low on verbal interaction, sensitivity to children's needs may be mediated through other channels than the verbal ones (e.g. Ochs & Schieffelin, 1984; Ochs, 1992; LeVine, LeVine, Richman, Tapia, Correa, & Miller, 1991; Richman, Miller, & LeVine, 1992). In line with this, comparative cultural studies have pointed to variations in mothers' responsivity patterns among countries and among mothers with different education levels (e.g. LeVine, LeVine, Richman, Tapia, Correa, & Miller, 1991; Richman, Miller, & LeVine, 1992; von der Lippe, 1995). This study therefore, wanted to evaluate whether the relationships between mothers' specific interactional

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and responsivity patterns and children's cognitive development demonstrated in Western research were the same or different in a country with markedly different child raising attitudes or whether cultural variation or "cultural scripts" (Richman et al, 1992) would amend the relationships in important ways. Specifically, the questions were raised:

1) does the relationship between the quality of maternal teaching, and children's educability and cognitive development observed in Norway have validity in a different culture (in casu Egypt)?

2) does maternal interactional style vary with education also in Egypt?

3) can maternal teaching be seen as a mediator of intelligence between parent and child?

The latter hypothesis would be strengthened if the quality of maternal interaction could be demonstrated to be a more powerful predictor of children's intelligence and educability than maternal intelligence and education.

Egypt may be described as a country in transition from a collectivistic orientation to one which also includes individualistic values (Barakat, 19xx; Hatem, 1987). With industrialization and urbanization, and the contemporary emphasis on competitive education, the society has introduced an orientation which comes in conflict with previous collective family values (Hatem, 1987; Hundeide, 1995). The Egyptian mother, who has the dominating responsibility for young children's socialization, is in a potential dilemma whether to raise the child to the traditional cultural competence required for family life or to the individualistic competence required for education.

Arab child-rearing has been described as restrictive and overprotective (e.g. Barakat, 19xx) and the Egyptian family as committed to communal values of family loyalty and compliance

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(e.g. Hatem, 1987). This was corroborated in the present study of socialization values of low income Cairene mothers (von der Lippe, 1995). In contrast, Norwegian mothers value autonomy, individual freedom and egalitarianism in their children characteristic of industrialized societies (e.g. Hundeide, 1995). The two societies may thus be seen to represent different "cultural scripts for ideal socialization.

¹ Methods

Subjects and procedure

The sample consisted of 26 children ($M = 6.81$ years; $SD = 1.05$ years; 8 girls and 18 boys) and 25 of their mothers ($M = 33.33$ years; $SD = 5.09$ years). One mother was deemed untestable. The data were collected in 1994-95 by one of the investigators with the help of a Norwegian teacher with a university degree in Arabic and 20 years of living in Cairo. Twentythree mothers lived with husbands aged 30-60 ($M=39.14$, $SD=6.06$). The families lived mostly in inner city Cairo ($N=19$) and some ($N=6$) lived in the suburbs. Most of the households consisted of the nuclear family only (three lived with three generations) and only six families had close kin in the neighborhood. All families had kin in larger Cairo. The sample consisted of people who considered themselves poor, lived in crowded environments and cheap houses in dark alleys, many of them hastily built to accommodate a fast growing metropolis and with deteriorating infrastructure. Twenty mothers were homemakers, 6 were employed. The average number of children was 2.9. The mothers' education varied from 0 to 16 years ($M=8.7$, $SD=5.3$). The fathers education was $M=11.0$, $SD=5.3$. The difference in

¹ This study is part of a larger cross-disciplinary study on cultural competence as a renewable resource in urban slums with professor Unni Wikan as principal investigator.

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education between spouses was statistically significant ($t=-2.97$, $p=.006$), but correlated positively ($r=.70$, $p=.000$). None of the mothers had parents or parents-in-law with more than 4 years of education.

The mothers and children were observed, interviewed and tested in the home, often with other kin and children present, sometimes alone.

Instruments

A. Running Horse Game Tests (RHGT). Maternal teaching style of different mediating quality and the children's cognitive competence and learning style, called child educability, were tested by methods developed by Hartmann and Haavind (1981), named Running Horse Game Tests (RHGT). The methods assess molar activities relevant for mediating processes between mother and child and related to a common theory of development. In accordance with Piaget (1950) and Piaget & Inhelder (1969), a gradually increasing degree of decentration is conceived as an important aspect of cognitive development. A cognitive structure is more decentred, the more it makes possible simultaneous considerations of several aspects or views of an object or situation.

RHGT test children when learning a game (Running Horse) from a trained assistant, and mothers when teaching the same game to another child of approximately the same age as her own. Mother and child are tested in separate settings, thus preventing interdependency among scores. A control study demonstrated that the mother's teaching strategy does not differ when teaching her own or another child of the same age (Haavind and Hartmann, 1977).

Running Horse is a competitive board game for two players. Each one has two horses. The game includes many rules about routes, short cut routes and potential set-backs which requires rule-understanding, planning and making choices in order to win. The structure of the game and the social matrix created by playing it is well suited for generalization to social conditions of daily life and for eliciting cognitive processes and learning and teaching strategies relevant for children age six to seven.

RHGT operationalizes mother's teaching quality according to ten coding categories, based on theoretical positions concerning how development of cognitive skills and independent behavior are facilitated or inhibited. According to the concept of decentration,

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pointing to relevant aspects and taking them simultaneously into considerations when demonstrating possibilities to make plans and choices, should have facilitating influence. The same should be true for stimulating the child to act independently. On the other hand, cognitive development might be delayed when the mother restricts the child's possibilities to reflect, choose, anticipate or act on account of his own understanding.

RGHT includes the following coding categories (scored in terms of frequencies): Informing, coded for statements where the mother gives information about the rules of the game. Informing is coded once for each item of information. A certain criterion of efficiency has to be passed in order to score for this category. Anticipation, coded every time the mother talks about what may or might happen in the game according to the possibilities the rules create. Demonstrating alternatives, coded every time the mother talks about the player's possibilities of choosing which horse to move. Seeking feedback, coded every time the mother overtly tries to check how the child understands the game. Imperative feedback, coded every time the child expresses uncertainty or acts against the rules, and the mother responds to this with an order without any explanation. The score, however, is calculated as a percentage of all situations requiring feedback. Ordering, coded every time the mother spontaneously directs the child or acts on behalf of the child without explaining why. Restriction, coded for different types of maternal behavior that are supposed to confuse the child: very vague and unintelligible information, instructions discordant to previous given information, ignoring situations where the child obviously is in need of feedback etc. Competition, coded every time the mother speaks about competitive elements of the game. Emotional support, coded every time the mother expresses verbal approval or other forms of overt support and reassurance. The coding categories differ from the original coding categories (Hartmann, 1991; Hartmann & Haavind, 1981) in only one way. Originally, in order to code Demonstrating alternatives, explicit focusing of at least two alternatives was required. This premise was dropped as otherwise only two or three mothers would have been coded for this category.

The instruction of the child was based on what Hunt (1971) defined as "intrinsic motivation". The quantity of new information was always balanced against the child's understanding. To obtain smooth communication and cooperation with the child, training was therefore not standardized in the strict sense of the word, but continuously adapted to the child's level of motivation and need for feedback and new information. Care was taken to engage the child in a dialogue around his thoughts and reflections while playing the game. The essential element was to challenge the child to understand that he should do his best, play as cleverly as possible, win the race, answer questions, listen to explanations and be task-orientated. Children find this situation non-threatening and rather amusing and challenging.

RGHT operationalizes child educability according to eight coding categories. The purpose is both to diagnose cognition and to record learning style. Behavior indicating the emergence of concrete operation was the main basis for diagnosing the child's cognition. Degree of decentration was most clearly indicated by the child's mastery of the rules, and by his ability to take several aspects into consideration when making plans and decisions. His learning style was traced from his reactions to cognitive demands and according to how appropriate or inappropriate his behavior was for the learning process. RGHT includes the following coding categories (scored in terms of frequencies): Rule mastery, coded every time the child spontaneously or with some

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help from the assistant uses a new rule in a correct as well as efficient way. Decision-making, coded every time the child spontaneously or with some help from the assistant set up an adequate choice where two or more alternatives are discriminated. Planning, coded every time the child spontaneously or with some help from the assistant puts forward adequate plans. Irrelevant discerning, coded every time the child makes or sticks to plans and decisions that are clearly not task-orientated. Adequate interest, coded every time the child expresses behavior which indicates interest and alert understanding. Inadequate reaction, coded every time the child expresses negative, irrelevant or too excited reactions. Passivity, coded every time the child is passive or unresponsive to questions or in other ways expresses uncertainty by just doing nothing. Competing, coded every time the child spontaneously focuses on the competitive aspects of the game. Adequate emotion, coded every time the child expresses emotional involvement that is relevant. The coding categories differ from the original coding categories (Hartmann, 1991; Hartmann & Haavind, 1981) in that Rule mastery, Decision making and Planning are coded also when the child has got some assistance, and not as originally, only when the child expresses the specific activity spontaneously. The premise of spontaneity was dropped as otherwise only a few children would have been coded for these categories. blind-coded.

RHGT was administered to the mothers and to the children at home, by an assistant unaware of the results on the tests of intelligence, and lasted about one hour respectively. The mother was taught the game and training continued until she mastered the game. Opportunities to plan and to choose were constantly demonstrated during the training. Questions about the rules were always answered. Questions about how to behave, however, were met by suggestions to act the way she found natural. The mother then administered the game to a child of approximately the same age as her own child. The dialogues were tape-recorded.

The maternal and child records were blind-coded by the second author. All categories were coded as presence or absence within each move of the maternal and the child records.

To obtain reduced descriptions of the differences within the mother and the child samples, separate principal component analyses were carried out. No rotation was used as it gave the best interpretable results for both set of scores. The analyses showed that for both mothers and children most of the coding categories were related to the first component, which accounted for 51.7% of the variance in the maternal sample and 44.4% in the child sample.

Insert Table 1 and 2 about here

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Table 1 and 2 present the means, standard deviations and the factor loadings on the first principal component for the ten maternal teaching and the eight child educability categories. All mean values are markedly lower than those found in previous Norwegian studies using RHGT (Hartmann, 1981; Hartmann & Haavind, 1991), whereas the large standard deviations, showed heterogeneity of performance. However, in both the maternal and the child sample the first factor seems to be a bipolar dimension reflecting respectively the mothers' degree of decentred teaching (DDT) and the children's degree of decentred educability (DDE). These latter findings are very similar to the results of Hartmann & Haavind (1981) and Hartmann (1991). Therefore in the further analyses the first principal factor score without rotation for each mother and each child was used as measure of maternal DDT and child DDE respectively. Positive scores for mothers reflect a decentred, informing teaching strategy of high mediating quality, adapted to the child's level of cognition, emotional state and actual behavior; whereas negative scores denote a centred, imperative strategy where essential mediating mechanisms are lacking or seldom occurring. On the whole the decentred mothers encouraged the child to explore, debate, take the role of another, and to see his or her behavior from different perspectives, whereas the centred mothers have an imperative approach that positively prevented the child from reflecting, decision making, planning or other ways of expressing his or her own opinions. These results are in line with the descriptions of maternal strategies of high versus low mediating quality given by other researchers (Bee et al., 1969; Hess and Shipman, 1968; Laosa, 1982).

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Positive scores for the children reflect decentred educability. In addition to expressing competent cognitive skills, children dominated by this approach were active, verbal and rather independent children with a purposive attitude to problemsolving and intellectual challenges. They were oriented towards logical principles as guide for behavior, and were able to make plans and decisions based on fairly complex and elaborated judgements. In contrast to this approach, negative scores denote centred educability. Children dominated by this kind of educability had a passive approach to intellectual challenges. Solutions to problems were reached by superficial, rather aimless guessing rather than by reflection. Generalization to rational principles was the exception, and decisions and plans were few, vague and determined by fortuitous factors.

B. Raven Standard Progressive Matrices

Intelligence tests were also administered to both mother and child. The intelligence of mothers was assessed by Raven Standard Progressive Matrices (Raven, Court, & Raven, 1992) and Raven Colored Progressive Matrices (Raven). The the mean and standard deviations for the maternal RAVEN were $M=22.25$ raw scores, $min=9$, $max=49$, $SD=9.01$ and the child RAVEN were $M=24.73$ percentile scores, $min=1$, $max=75$, $SD=19.96$. Compared to samples published in the manual, these scores were quite low.

Results

The correlation between the maternal DDT and child DDE are shown in Table 3. DDT was significantly related to DDE and also to the parents' education, the mother's intelligence and the father's occupation. These variables form a cluster. It was also related to an index of the mother's verbal interaction as observed with the child during several visits

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outside the test situation and corroborates that mother's behavior during the game with another child was reflected in interactions with her child. The verbal index consisted of ratings of the mother's interactions with the child such as speaking to the child, answering questions, structuring activity and praising the child while being interviewed by the investigators.

Age and sex were not related to RHGT scores.

insert table 3 about here

The strength of DDT as predictor of DDE and the children's Raven scores were tested in stepwise regression analyses. When DDT, mother's intelligence and education were regressed on DDE and the children's Raven, DDT was the only significant predictor of both. When the mother's intelligence and education were forced into the equation first, DDT did not significantly add to the prediction of DDE, but added significantly to the prediction of the children's intelligence. The analyses are presented in table 4.

insert table 4 and 5 about here

Discussion

The demonstrated significant relationship between maternal DDT and child DDE confirms previous results obtained with RHGT in different Norwegian mother-child samples (Hartmann, 1991; Hartmann & Haavind, 1981). The similarity in the demonstrated factors

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and their relationships are remarkable considering the differences in levels of performance on all variables in the samples from the two cultures.

The mother's intelligence and education were related to her teaching, and less strongly to the child's educability. Her teaching strategy was, however, more predictive than intelligence and education of the child's educability and was a substantially more predictive factor of the child's intelligence.

The mediating mechanisms described by RHGT do not characterize all interaction between mother and child. Both have a wider spectrum of interactions. RHGT forces the mother to adopt a teaching rationale for the ensuing interactions in the game, which may not characterize other natural life interactions. The positive relationship between the mother's teaching style tested by RHGT and her verbal supportive interactions observed with her own child during interviews, however, suggests some generalizability from her test behavior to natural life situations, even though this type of game was unfamiliar to a number of the Egyptian mothers.

It is worth noting that intelligence and educability were not related in this study and they may reflect different aspects of cognitive competence. Maternal teaching seems, however, to predict both and both are known to be important predictors of later educational competence. Besides pointing to maternal teaching as a powerful mediator between mother and child intelligence, the results indicate that it can be seen as an important factor in the preparation of children's educational competence.

Previous literature has pointed to large variability in mother responsiveness in different populations, whereas the effect of the interaction of cultural factors and responsiveness on

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child behavior has been less explored. The present finding of parallel factors and covariations in two cultures with different socialization ideals is suggestive that the effects of maternal teaching have some transcultural validity. The same may be said for education.

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Table 1

Mothers' teaching scores: means, standard deviation and factor loadings on factor 1.

Mothers	Means	St.dev.	factor loadings
Imperative feed back	54.92	29.51	-.7793
Information	20.20	14.02	.9544
Restriction	15.44	10.55	-.8085
Seeking feedback	9.08	6.82	.8406
Ordering	8.00	5.35	-.6711
Emotional support	5.44	8.51	.6440
Anticipation	2.24	2.18	.6176
Demonstrating	1.88	2.64	.8161
alternatives			
Competition centred	1.60	1.78	.4448
on child			
Competition centred	1.04	1.34	-.6440
on self			

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Table 2

Children's educability scores: means, standard deviations and factor loadings on factor 1.

Children	Means	St.dev.	factor loadings
Passivity	17.73	20.90	-.7165
Rule mastery	14.08	8.51	.8366
Adequate interest	12.92	9.44	.6693
Planning	4.23	3.90	.8711
Inadequate reaction	3.81	4.39	.5030
Decision making	3.35	3.69	.7497
Competition	2.15	2.77	.3848

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Table 3

Correlations between DDT, DDE and intelligence, observed verbal interaction and demographic variables.

Variables	DDT	DDE
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Child

Intelligence	.70**	.18
DDE	.45*	-
Age	.24	-.14
Sex	-.14	-.26

Mother

Raven	.51**	.36
Verbal interaction	.49*	.43*
Education	.55**	.44*

Father

Education	.53**	.54**
Occupation	.38	.52**

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Table 4

Stepwise multiple regression analyses with child's educability and intelligence as dependent variables and maternal intelligence, education and teaching as predictor variables.

Independent variables	MultR	R ²	F(1,22)	p
		Educability		
Maternal teaching	.446	.20	5.72	.02

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Table 5

Stepwise multiple regression with the child's educability and intelligence as dependent variables and maternal teaching as independent variable controlled for maternal intelligence and education.

Independent variables	MultR	R2	Fch	p
Educability				
Maternal intelligence	.360	.13	3.42	.08
Maternal education	.451	.20	2.03	.17
Maternal teaching	.505	.26	1.47	.24
Intelligence				
Maternal intelligence	.512	.26	8.21	.01
Maternal education	.533	.28	.64	.03
Maternal teaching	.728	.53	10.97	.00